Federal Democratic Republic of Ethiopia

EDICT OF GOVERNMENT

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ET 667 (2001) (English):
CEREALS-DETERMINATION OF THE IMPURITIES CONTENT

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ETHIOPIAN
STNADRAD

ES 667:2001
(Reaffirmed:2012)

First edition

Cereals — Determination of the of the impurities content

ICS: 67.060

Published by Ethiopian Standards Agency

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Foreword

This Ethiopian Standard has been prepared under the direction of the Technical Committee for Cereals, pulses and derived products (TC 11) and published by the Ethiopian Standards Agency (ESA).

The standard is a reaffirmation for reprint of the Ethiopian Standard ES :2001, - , with some editorial changes without altering the technical contents in the former text.

Cereals — Determination of the impurities content

1 Scope

This Ethiopian Standard specifies the requirements for determining the content of impurities in wheat and barley grains.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Ethiopian Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Ethiopian Standard are encouraged to investigate the possibility of applying the most recent editions of the Ethiopian Standards indicated below. Registers of currently valid standards are maintained in the Quality and Standards Authority of Ethiopia.

ES ISO 5223:2001*, Test sieves for cereals.*

ES ISO 13690:2001, *Cereals pulses and milled products – Sampling of static batches.*

3 Principle

Separation of the impurities, by sieving and grading, into the categories shown in Table 1.

Table 1 - Categories of impurities

Category of impurity	Corresponding main category
Broken grains Shrivelled grains Unsound grains Grains attacked by pests	Damaged wheat grains
Other cereals	Other cereals
Organic extraneous matter Inorganic extraneous matter	Extraneous matter
Harmful and/or toxic seeds and bunted grains Ergot	Harmful and/or toxic seeds and bunted grains and ergot

4 Apparatus

4.1 Set of test sieves

With long rounded apertures, comprising sieves of

1.00 mm x 20.0 mm,

1.70 mm x 20.0 mm,

2.50 mm x 20,0 mm,

2.80 mm x 20.0 mm,

3.55 mm x 20.0 mm and conforming to ES ISO 5223 (ES 4161) a receiver and a lid,

4.50 mm x 20 mm.

4.2 Sample divider

Conical sampler or multiple-slot sampler with a distribution system.

4.3 Tweezers, scalpel and paintbrush

4.4 Dishes

4.5 Shallow container

Having a surface area of at least 200 cm^2.

4.6 Balance

Accurate to 0.01 g.

5 Sampling

Sampling of grains shall be carried out in accordance with the method of test specified in ES ISO 13690 or ES ISO 6644.

6 Procedure

If a grain exhibits several defects it shall be classified in the category with the lowest maximum permissible level (see table 1).

Any components which get stuck in the slots of a sieve shall be considered to be retained by the sieve.

6.1 Preparation of the test sample

Carefully mix the laboratory sample to make it as uniform as possible, then proceed to reduce it, if necessary, using a divider (4.2) until a quantity of approximately 1 000 g is obtained.

Weigh the test sample so obtained to the nearest 1 g and place it in the container (4.5).

During the preparation of the test sample, note whether any particular odour or odour foreign to that of wheat is detected, and any presence of living or dead, insects (specified in annex B) or other anomalies.

6.2 Determination of ergot

Separate ergot from the test sample (6.1), put it in a dish and weigh it to the nearest 0.01g.

6.3 First division

Mix thoroughly the sample from which the ergot has been removed and divide it using the divider (4.2) until a quantity of approximately 250g is obtained.

Weigh the test portion so obtained to the nearest 0.01g, and if any husked grains are observed, separate them from their envelopes before the first sieving.

6.4 First sieving

Fit together the 3.55 mm sieve, the 1.00 mm sieve and the receiver, so that the sieve apertures are positioned parallel to each other.

Place the test portion 6.3 on the 3.55 mm sieve and put on the lid.

Shake manually for 45 s with a forwards-and-backwards motion in the direction of the slots of the sieve, keeping the sieve in a horizontal plane.

From the material which did not pass through the 3.55 mm sieve, separate, by placing them in the dishes 4.4 the other cereals the organic and inorganic components of the extraneous matter, harmful and/or toxic seeds and bunted grains and any wheat grains which have been retained. The retained wheat grains shall then be added to the material which does not pass through the 1.00 mm sieve. Add the inorganic elements of the extraneous matter to the material which has passed through the 1.00 mm sieve. Weigh the fractions thus obtained to the nearest 0.01 g.

6.5 Second division

Mix thoroughly the material which has not passed through the 1.00 mm sieve and divide it using the divider (4.2) until approximately 60 g is obtained. Weigh to the nearest 0.01the portion thus obtained.

Spread out the portion, then separate and classify, by placing them in the dishes, the broken grains other cereals , organic and inorganic extraneous matter, the unsound grains, grains attacked by pests , harmful and/or toxic seeds and bunted grains . Weigh each fraction to the nearest 0.01 g.

6.6 Second sieving

Pour the portion from which the impurities specified in (6.5) have been removed onto the 1.70 mm sieve fitted with a receiver and put on the lid.

Shake manually for 45s with a forwards- and -backwards motion in the direction of the slots of the sieve, keeping the sieve in the horizontal plane.

Weigh to the nearest 0.01 g the undersize grain thus obtained which corresponds to the shrivelled grains.

6.7 Number of determinations

Repeat the determination on the same test sample, using another test portion obtained as specified in (6.3).

7 Expression of results

Express the content of each category of impurity, using the formulae given below, as a percentage by mass of the grains as received.

Take as the result the arithmetic mean of the two determinations (6.7).

Give the result to one decimal place, except for harmful and toxic seeds, bunted grains and ergot, for which the result shall be given to two decimal places.

Broken grains	$C \times m_6$
Shrivelled grains	$C \times m_{13}$
Unsound grains	$C \times m_{10}$
Grains attacked by pests	$C \times m_{11}$

Other cereals

$$\frac{100}{m_x} \times m_2 + C \times m_7$$

Extraneous matter (organic and inorganic)

$$\frac{100}{m_x}\ (m_3 + m_4) + C(m_8 + m_9)$$

Inorganic extraneous matter

$$\frac{100}{m_x} \times m_4 + C \times m_9$$

Harmful and/or toxic seeds, bunted grains and ergot

$$\frac{100}{m_w} \times m_1 + \frac{100}{m_x} \times m_5 + C \times m_{12}$$

Ergot

$$\frac{100}{m_w} \times\ m_1$$

where

C is a coefficient common to the categories of impurity obtained after the second division equal to

$$\frac{100}{m_z} \times \frac{m_y}{m_x}$$

M_w is the mass, in grams, of the test sample (about 1 000g);

M_x is the mass, in grams, of the test portion (about 250g);

M_y is the mass, in grams, of the material retained on the 1.00 mm sieve, i.e. $m_y = m_x - (m_2+m_3+m_4+m_5)$;

M_z is the mass, in grams, of the portion obtained in 6.5 (about 60g);

M_1 is the mass, in grams, of ergot in test sample;

M_2 is the mass, in grams, of other cereals retained on the 3.55 mm sieve;

M_3 is the mass, in grams, of other cereals retained on the 3.55 mm sieve;

M_4 is the mass, in grams, of organic extraneous matter retained on the 3.55mm sieve and of the material which passed through the 1.00 mm sieve;

M_5 *is the mass, in grams, of harmful and /or toxic seeds and bunted grains retained on the 3.55 mm sieve;*

M_6 *is the mass, in grams, of the broken grains retained on the 1.00 mm sieve;*

M_7 *is the mass, in grams, of other cereals retained on the 1.00 mm sieve;*

M_8 *is the mass, in grams, of orgainc extraneous matter retained on the 1.00 mm sieve;*

M_9 *is the mass, in grams, of inorganic extraneous matter retained on the 1.00 mm sieve;*

M_{10} *is the mass, in grams, of unsound grains retained on the 1.00 mm sieve;*

M_{11} *is the mass, in grams, of grains attacked by pests retained on the 1.00 mm sieve;*

M_{12} *is the mass, in grams, of harmful and /or toxic seeds and bunted grains retained on the 1.00 mm sieve;*

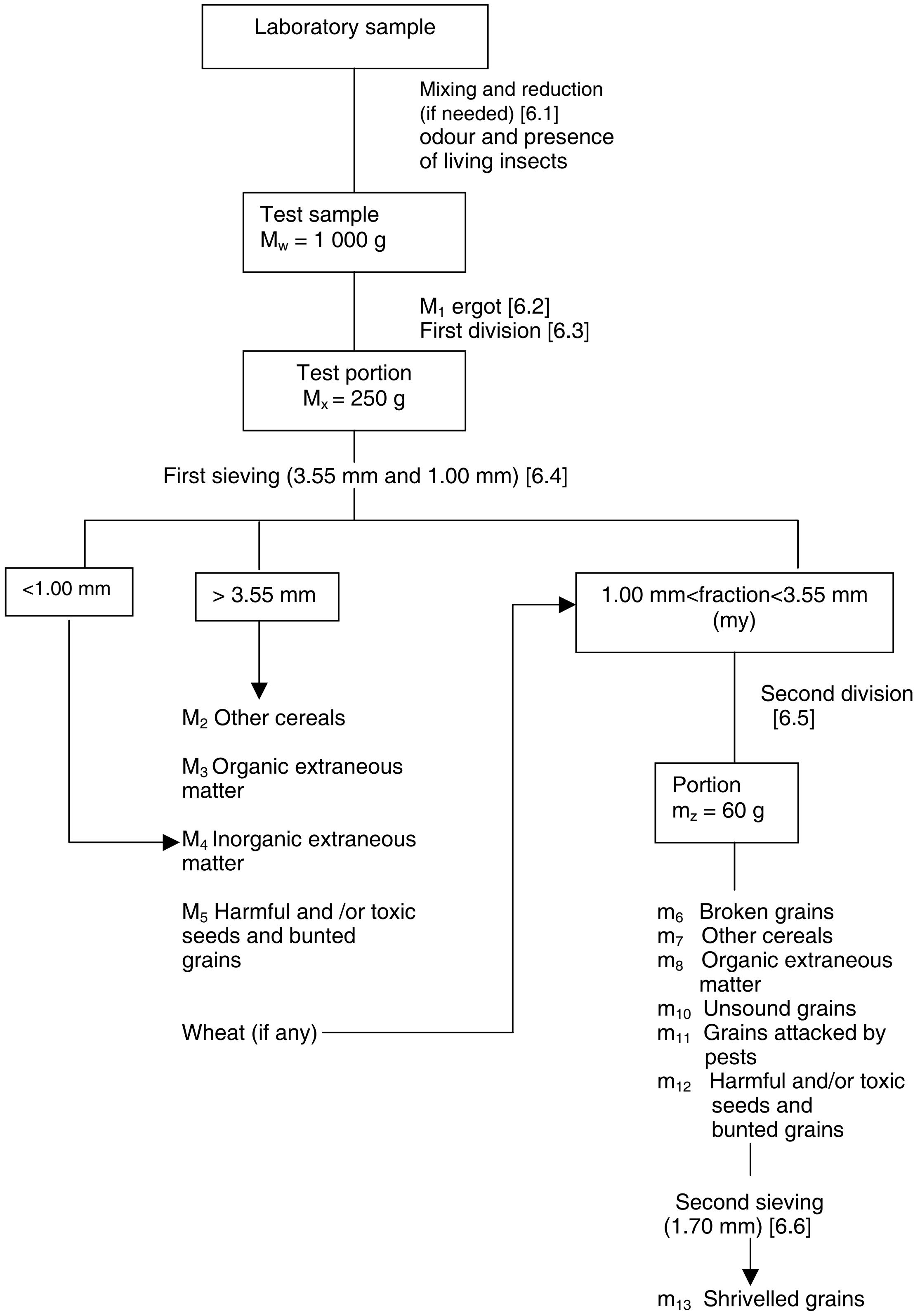
M_{13} *is the mass, in grams, of shrivelled grains which passed through the 1.70 mm sieve.*

8 Test report

The test report shall indicate the method used and the result obtained. It shall also give details of any operations not specified in this Ethiopian Standard, or regarded as optional, as well as any incidents which may have affected the result.

The test report shall give all information necessary for the complete identification of the sample.

9 Scheme of procedure


Laboratory sample
Mixing and reduction (if needed) [6.1]
odour and presence of living insects
Test sample
M_w = 1 000 g
M_1 ergot [6.2]
First division [6.3]
Test portion
M_x = 250 g
First sieving (3.55 mm and 1.00 mm) [6.4]
<1.00 mm
> 3.55 mm
1.00 mm<fraction<3.55 mm (my)
M_2 Other cereals
M_3 Organic extraneous matter
M_4 Inorganic extraneous matter
M_5 Harmful and /or toxic seeds and bunted grains
Wheat (if any)
Second division [6.5]
Portion
m_z = 60 g
m_6 Broken grains
m_7 Other cereals
m_8 Organic extraneous matter
m_{10} Unsound grains
m_{11} Grains attacked by pests
m_{12} Harmful and/or toxic seeds and bunted grains
Second sieving (1.70 mm) [6.6]
m_{13} Shrivelled grains

Annex A
(informative)

Bibliography

ISO 6322-1:1981, Storage of cereals and pulses - Part 1: General considerations in keeping cereals.

ISO 6322-2:1981, Storage of cereals and pulses - Part 2: Essential requirements.

ISO 6322-3:1989, Storage of cereals and pulses - Part 3: Control of attack by pests.

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Ethiopian Standards Agency

Organization and Objectives

The Ethiopian Standards Agency (ESA) is the national standards body of Ethiopia established in 2010 based on regulation No. 193/2010.ESA is established due to the restructuring of Quality and Standards Authority of Ethiopia (QSAE) which was established in 1970.

ESA's objectives are:-

- Develop Ethiopian standards and establish a system that enable to check weather goods and services are in compliance with the required standards,
- Facilitate the country's technology transfer through the use of standards,
- Develop national standards for local products and services so as to make them competitive in the international market.

Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational Institutions, research institutes, government organizations, certification, inspection, and testing organizations, regulatory bodies, consumer association etc. The requirements and/ or recommendations contained in Ethiopian Standards are consensus based that reflects the interest of the TC representatives and also of comments received from the public and other sources. Ethiopian Standards are approved by the National Standardization Council and are kept under continuous review after publication and updated regularly to take account of latest scientific and technological changes.
Orders for all Ethiopian Standards, International Standard and ASTM standards, including electronic versions, should be addressed to the Documentation and Publication Team at the Head office and Branch (Liaisons) offices. A catalogue of Ethiopian Standards is also available freely and can be accessed in from our website.

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International Involvement
ESA, representing Ethiopia, is a member of the International Organization for Standardization (ISO), and Codex Alimentarius Commission (CODEX). It also maintains close working relations with the international Electro-technical Commission (IEC) and American Society for Testing and Materials (ASTM).It is a founding member of the African Regional Organization for standardization (ARSO).

More Information?
Contact us at the following address.
The Head Office of ESA is at Addis Ababa.

☎ ***011- 646 06 85, 011- 646 05 65***
📠 ***011-646 08 80***
✉ ***2310 Addis Ababa, Ethiopia***
E-mail: info@ethiostandards.org,
Website: www.ethiostandards.org

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